

## Expanded Form, and Scientific Notation

Why even learn this? It is a way to take huge numbers and express them as smaller numbers. It also makes it easier to compare large numbers.

## EXPANDED FORM

Example:

$$31\,964\,434 = 30\,000\,000 + 1\,000\,000 + 900\,000 + 60\,000 + 4\,000 + 400 + 30 + 4$$

Using Powers of 10 in the expanded form

First write each number as a product of a whole number and a multiple of ten

$$3 \times 10^7 + 1 \times 10^6 + 9 \times 10^5 + 6 \times 10^4 + 4 \times 10^3 + 4 \times 10^2 + 3 \times 10 + 4$$

Then as a power of ten

A number written in scientific notation is a product of two numbers, one is a power of ten, and one is a number between 1 and 10. (how far over are you moving the decimal?)

$$4.1 = 4.1 \times 10$$

$$410 = 4.10 \times 10^2$$

$$\begin{array}{r} \text{---} \cdot \text{---} \\ 4105 \end{array} = 4.105 \times 10^3$$

$$\begin{array}{r} | \\ 41\ 057 \end{array} = 4.1057 \times 10^4$$

$$410\ 578 = 4.10578 \times 10^5$$

Homework: pg 21

1a-b

2-5

10

Write each number in expanded form using powers of ten. How could you check your answer?

a) 834 000

b) 98 977 183

Which is greater? Explain.

a)  $4 \times 10^3 + 6 \times 10^2 + 6 \times 10^1 + 7$  or 4327

b)  $2 \times 10^4 + 4 \times 10^3 + 2 \times 10^2 + 4 \times 10^1$  or 2432

c)  $7 \times 10^7 + 7 \times 10^3$  or 777 777

For each power of 10, write the exponent that makes each statement true. How do you know?

$$7000 = 7 \times 10^?$$

$$20\,000 = 2 \times 10^?$$

$$400\,000 = 4 \times 10^?$$

$$704 = 7.04 \times 10^?$$

$$2890000 = 2.89 \times 10^?$$

$$71 = 7.1 \times 10^?$$

Write each number in Scientific Notation.  
Check with a calculator.

1 532 000

31000

4 600 000 000

150

6 000 100

147 032

Order the numbers in each set from least to greatest.

$1.6 \times 10^3$ , 1616,  $6.1 \times 10^2$ , 616

$2.453 \times 10^6$ , 248 555,  $2.4531 \times 10^6$ , 2 453 101



The mean of 5 numbers is  $7.5 \times 10^4$

Four of the numbers are: 50 000, 100 000, 75 000, 80 000

What is the 5th number? How do you know?